CHAPTER 8

NATIONAL DATA BUOY CAPABILITIES AND REQUIREMENTS

8.1. General.

8.1.1. Automated Reporting Stations. The National Data Buoy Center (NDBC) maintains automated reporting stations in the Gulf of Mexico, in coastal areas and deep ocean of the Atlantic and Pacific Oceans, and in the Great Lakes. These data acquisition systems collect real-time meteorological and oceanographic measurements for operations and research purposes. Moored buoy station locations and configurations are given in Table 8-1. The locations of Coastal-Marine Automated Network (C-MAN) stations are listed in Table 8-2. Consult NDBC's web page at www.ndbc.noaa.gov to view the station locations and latest station operating status, and for site-specific information. Specific questions may be addressed to NDBC Observing Systems Branch, Stennis Space Center, Mississippi 39529-6000, phone 228-688-3134.

8.1.2. Data Acquisition. Moored buoy and C-MAN stations routinely acquire, store, and transmit data every hour; a few selected stations report more frequently. Data obtained operationally include sea level pressure, wind speed and direction, peak wind, and air temperature. Sea surface temperature and wave spectra data are measured by all moored buoys and a limited number of C-MAN stations. Relative humidity is measured at several stations. Ocean currents and salinity are measured at a few coastal stations.

NDBC acquires, encodes, and distributes data from regional coastal ocean observing systems which is distributed to customers via NWS dissemination systems. Data from participating regional observing systems pass through NDBC data quality control procedures prior to NWS dissemination. Information on these systems may be obtained from their respective web sites that are linked to www.ndbc.noaa.gov.

8.1.3. Drifting Buoys.

8.1.3.1. NDBC. NDBC is capable of acquiring, preparing, and deploying drifting buoys; however, an operational drifting buoy requirement has not been identified or funded.

8.1.3.2. Navy. Since 1998, the Naval Oceanographic Office (NAVOCEANO) has deployed meteorological drifting buoys to report surface meteorological and oceanographic measurements, for operational purposes, as tropical systems move through data sparse regions tracking toward the U.S. East Coast. Additionally, Navy drifting buoys have been deployed in the Intertropical Convergence Zone (ITCZ). The drifting buoy measurements, which are available to tropical forecasters, provide invaluable input for defining tropical storm movement and intensity, improve forecast model initialization, and give tropical forecasters a much better sense of storm characteristics and track as they approach the fleet concentration areas of Jacksonville, FL, and Norfolk, VA. Drifting buoys typically have a life span of 1 to 2 years, and the data are available through the NAVOCEANO homepage and through standard World Meteorological Organization (WMO) data sources.

NAVOCEANO acquires, prepares, and deploys drifting meteorological buoys based on operational requirements identified by Commander-in-Chief, Atlantic Fleet (CINCLANTFLT). Currently, CINCLANTFLT has identified the Navy's drifting buoy support as a standing requirement to support fleet safety, assist in fleet sortie decisions, and enhance tropical weather preparedness.

8.2. Requests for Drifting Buoy Deployment. Drifting buoy deployments should be coordinated through the Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA). *Deployments will be requested through the Office of the Federal Coordinator for Meteorology (OFCM) to HQ Air Force Reserve Command (AFRC).* Deployments in advance of a U.S. land-threatening hurricane require a 36- to 48-hour notification.

8.2.1. Tropical Prediction Center/National Hurricane Center (TPC/NHC). TPC/NHC forecasters will issue through the Tropical Cyclone Plan of the Day (TCPOD) an alert or outlook for drifting buoy deployment 48 hours before the planned deployment. *Hard tasking for the deployment will be issued via the TCPOD 16 hours, plus flying time to the deployment location, before the event.*

8.2.2. Deployment of Buoys. DOC may request the deployment of a drifting buoy and subsurface float array with up to 40 elements at a distance of 200 to 400 nm from the storm center, depending on the dynamics of the storm system. *DOC will ensure the buoys and mission-related DOC personnel are delivered to AFRC.* The specific DOC request for placement of the buoys will depend on several factors, including:

- Characteristics of the storm, including size, intensity, and velocity.
- Storm position relative to the coast and population centers.
- Availability of aircraft and dropsonde operators (DSO) certified for buoy deployment.

8.2.3. Deployment Position. The final deployment position will be provided before the flight crew briefing. An example of a possible buoy and float deployment pattern from the recent CLBAST Experiment is shown in Figure 8-1.

8.3. Communications. Moored buoy and C-MAN data are transmitted via NOAA Geostationary Operational Environmental Satellite (GOES) to the National Environmental Satellite, Data, and Information Service (NESDIS) and then are relayed to the NWS Telecommunications Gateway (NWSTG) for processing and dissemination. Moored buoy observations are formatted into the World Meteorological Organization (WMO) FM13-IX SHIP code. The SHIP code is defined in Federal Meteorological Handbook 2, Surface Synoptic Codes. C-MAN measurements are formatted into C-MAN code, which is very similar to the WMO FM12-IX SYNOP code. Code forms are shown in Table 8-3. The C-MAN code is contained in the C-MAN Users' Guide, which is available from NDBC. Drifting buoy data are sent through the NOAA Polar Orbiting Environmental Satellites (POES) to the U.S. Argos Global Processing Center, Largo, MD. Service Argos processes and formats the data into WMO FM18 BUOY code defined in the WMO *Manual on Codes*, Volume I. The messages are routed to the NWSTG for distribution.

Table 8-1. Moored buoy locations and configurations

SITE	STATION ID	LOCATION	HULL SIZE (m)	ANEMOMETER HEIGHT (m)
GULF OF MEXICO	42001	25.9E N., 89.7E W.	10	10
	42002	25.2E N., 94.4E W.	10	10
	42003	26.0E N., 85.9E W.	10	10
	42007	30.1E N., 88.8E W.	3	5
	42019	27.9E N., 95.4E W.	3	5
	42020	26.9E N., 96.7E W.	3	5
	42035	29.2E N., 94.4E W.	3	5
	42036	28.5E N., 84.5E W.	3	5
	42039[1]	28.8E N., 86.0E W.	3	5
	42040[1]	29.2E N, 88.2E W.	3	5
	42041	27.5E N, 90.5E W.	3	5
ATLANTIC OCEAN	41001	34.7EN., 72.7EW.	6	5
	41002	32.3EN., 75.4EW.	6	5
	41004	32.5EN., 79.1EW.	3	5
	41008	31.4EN., 80.9EW.	3	5
	41009[1]	28.5EN., 80.2EW.	3	5
	41010[1]	28.9EN., 78.5EW.	6	5
	41012	30.0EN, 80.60EW.	3	5
	41013	33.5EN, 77.6EW.	3	5
	41025	35.2EN, 75.3EW.	3	5
	44004	38.5EN., 70.5E W.	6	5
	44005	42.9EN., 69.2E W.	6	5
	44007	43.5EN., 70.1E W.	3	5
	44008	40.5EN., 69.4EW.	3	5
	44009	38.5EN., 74.7EW.	3	5
	44011	41.1EN., 66.6EW.	6	5
	44013	42.4EN., 70.7EW.	3	5
	44014[1]	36.6EN., 74.8EW.	3	5
	44017	40.7EN., 72.0EW.	3	5
	44018	41.3EN., 69.2EW.	3	5
	44025	40.3EN., 73.2EW.	3	5
	44027	44.3EN, 67.3EW	3	5
PACIFIC OCEAN (BETWEEN 10EN. AND 40EN.)	46011	34.9E N., 120.9E W.	3	5
	46012	37.4E N., 122.9E W.	3	5
	46013	38.2E N., 123.3E W.	3	5
	46014	39.2E N., 124.0E W.	3	5
	46023[1]	34.7E N., 121.0E W.	10	10
	46025	33.8E N., 119.1E W.	3	5
	46026	37.8E N., 122.8E W.	3	5
	46011	34.9E N., 120.9E W.	3	5
	46012	37.4E N., 122.9E W.	3	5
	46013	38.2E N., 123.3E W.	3	5
	46014	39.2E N., 124.0E W.	3	5
	46023[1]	34.7E N., 121.0E W.	10	10

continued	46062[1]	35.1E N., 121.0E W.	3	5
PACIFIC OCEAN	46063	34.3E N., 120.7E W.	6	5
(BETWEEN 10EN.	46069	33.6E N., 120.2E W.	3	5
AND 40EN.)	46086	32.5E N., 118.0E W.	3	5
	51001	23.4E N., 162.2E W.	6	6
	51002	17.2E N., 157.8E W.	6	6
	51003	19.2E N., 160.7E W.	6	6
	51004	17.5E N., 152.5E W.	6	5
	51028	0.0E N., 153.9E W.	3	5

[1]Temporary site established with other special funding.

Table 8-2. C-MAN sites

SITE	STATION ID	LOCATION	STATION NAME
GULF OF MEXICO	BURL1	28.9E N., 89.4E W.	Southwest Pass, LA
	CDRF1	29.1E N., 83.0E W.	Cedar Key, FL
	DPIA1	30.3E N., 88.1E W.	Dauphin Island, AL
	DRYF1	24.6E N., 82.9E W.	Dry Tortugas, FL
	GDIL1	29.3E N., 90.0E W.	Grand Isle, LA
	KTNF1	29.8E N., 83.6E W.	Keaton Beach, FL
	LONF1	24.8E N., 80.9E W.	Long Key, FL
	PTAT2	27.8E N., 97.1E W.	Port Aransas, TX
	SGOF1	29.4E N., 84.9E W.	Tydall AFB Tower C, FL
	SRST2	29.7E N., 94.1E W.	Sabine, TX
	VENF1	27.1E N., 82.4E W.	Venice, FL
ATLANTIC OCEAN	ALSN6	40.5E N., 73.8E W.	Ambrose Light, NY
	BUZM3	41.4E N., 71.0E W.	Buzzards Bay, MA
	CHLV2	36.9E N., 75.7E W.	Chesapeake Light, VA
	CLKN7	34.6E N., 76.5E W.	Cape Lookout, NC
	DUCN7	36.2E N., 75.8E W.	Duck Pier, NC
	FBIS1	32.7E N., 79.9E W.	Folly Island, SC
	FPSN7[2]	33.5E N., 77.6E W.	Frying Pan Shoals, NC
	FWYF1	25.6E N., 80.1E W.	Fowey Rocks, FL
	IOSN3	43.0E N., 70.6E W.	Isle of Shoals, NH
	LKWF1	26.6E N., 80.0E W.	Lake Worth, FL
	MDRM1	44.0E N., 68.1E W.	Mt. Desert Rock, ME
	MISM1	43.8E N., 68.9E W.	Matinicus Rock, ME
	MLRF1	25.0E N., 80.4E W.	Molasses Reef, FL
	SANF1	24.5E N., 81.9E W.	Sand Key, FL
	SAUF1	29.9E N., 81.3E W.	St. Augustine, FL
	SMKF1	24.6E N., 81.1E W.	Sombrero Key, FL
	SPGF1	26.7E N., 79.0E W.	Settlement Point, GBI
	TPLM2	38.9E N., 76.4E W.	Thomas Point, MD
EASTERN PACIFIC OCEAN	CARO3	43.3E N., 124.4E W.	Cape Arago, OR
(SOUTH OF 45E N.)	NWPO3	44.6E N., 124.1E W.	Newport, OR
	PTAC1	39.0E N., 123.7E W.	Point Arena, CA
	PTGC1	34.6E N., 120.6E W.	Point Arguello, CA

[1]Temporary site established with other special funding.
[2] Station will operate until platform fails; service visits discontinued due to condemnation of observing site

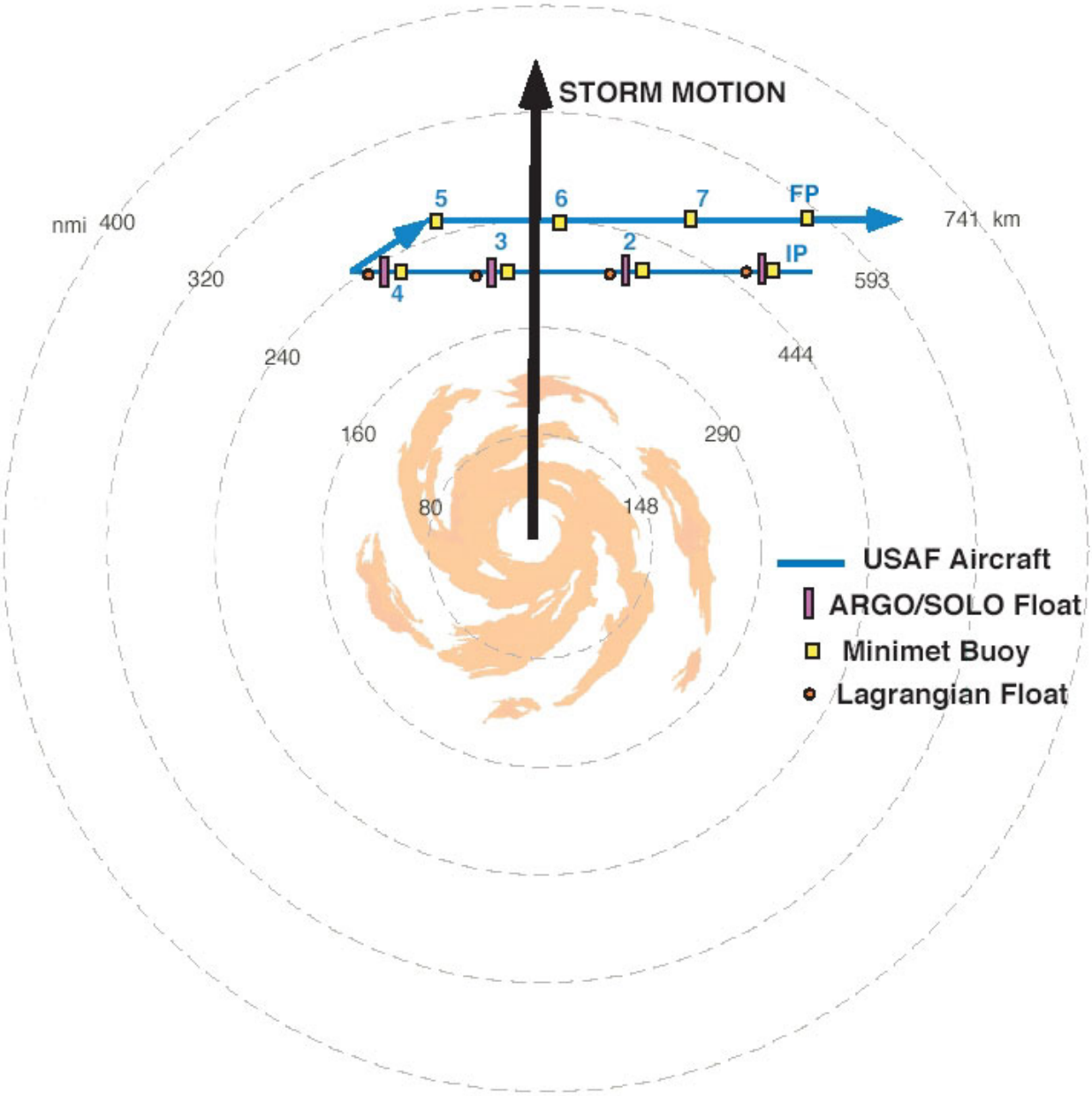

Figure 8-1. Example Buoy and Float Deployment Pattern

Table 8-3. Code forms for moored data buoys, C-MAN stations, and drifting buoys

FORM	CODE
FM13IX (SHIP) REPORT OF SYNOPTIC SURFACE OBSERVATION FROM A SEA STATION (AUTOMATIC WEATHER STATION)	$M_iM_iM_jM_j$ $A_1b_wn_bn_bn_b$ YYGGi_w 99$L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ i_ri_x/// /ddff 1s_nTTT (2$s_n$$T_dT_dT_d$) 3$P_oP_oP_oP_o$ 4PPPP 5appp 9GGgg 222oo $Qs_sT_wT_wT_w$ 1$P_{wa}P_{wa}H_{wa}H_{wa}$ 7o $H_{wa}H_{wa}H_{wa}$ 333 912ff (oofff) 555 11fff 22fff (3GGgg 4ddf_mf_m) (6$G_cG_cg_cg_c$ $d_1d_1d_1f_1f_1f_1$ $d_6d_6d_6f_6f_6f_6$) $d_2d_2d_2f_2f_2f_2$ $d_3d_3d_3f_3f_3f_3$ $d_4d_4d_4f_4f_4f_4$ $d_5d_5d_5f_5f_5f_5$
U.S. NATIONAL (C-MAN LAND STATION) MODIFIED FM12-IX SYNOP	CMAN YYGGi_w XXXXn_t i_Ri_xhVV Nddff (oofff) 1s_nTTT 2$s_n$$T_dT_dT_d$ 3$P_oP_oP_oP_o$ 4PPPP 5appp 6RRRt_R 9GGgg 222// os$_n$$T_wT_wT_w$ 1$_{wa}P_{wa}P_{wa}H_{wa}H_{wa}$ 7o$H_{wa}H_{wa}H_{wa}$ 333 912ff (oofff) 444 1$P_{av}P_{av}P_{av}$ / 555 11fff 22fff (3GGgg) (4dd$f_mf_mf_m$) (6$G_cG_cg_cg_c$ $d_1d_1d_1f_1f_1f_1$ $d_6d_6d_6f_6f_6f_6$) $d_2d_2d_2f_2f_2f_2$ $d_3d_3d_3f_3f_3f_3$ $d_4d_4d_4f_4f_4f_4$ $d_5d_5d_5f_5f_5f_5$ (TIDE1111)
FM18 BUOY REPORT OF A DRIFTING BUOY OBSERVATION	ZZYY A_1 $b_wn_bn_bn_b$ YYMMJ GGggi$_w$ Q_c $L_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$ 6Q_1 Q_t O_d / 111Q_dQ_x O$_d$dff (1$_{SN}$ TTT) [(2$_{SN}$$T_dT_dT_d$) or (29 uuu)] (3$P_oP_oP_oP_o$) (4PPPP) (5appp) 222$Q_dQ_x$ (Os$_n$$T_wT_wT_w$) (1$P_{wa}P_{wa}H_{wa}H_{wa}$) (2O$P_{wa}P_{wa}P_{wa}$) (21$H_{wa}H_{wa}H_{wa}$) 333$Q_{d1}Q_{d2}$ (8887k_2 2$z_oz_oz_oz_o$ 3$T_oT_oT_oT_o$ 4$S_oS_oS_oS_o$ .... 2$z_nz_nz_nz_n$ 3$T_nT_nT_nT_n$ 4$S_nS_nS_nS_n$) (66$k_6$9k_3 2$z_oz_oz_oz_o$ $d_od_oc_oc_oc_o$ .... 2$z_nz_nz_nz_n$ $d_nd_nc_nc_nc_n$) 444 (1$Q_pQ_2Q_{Tw}Q_4$) (2Q_NQ_L//) [($Q_cL_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$ or (YYMMJ GGgg/)] (8$V_iV_iV_iV_i$) (9$_{1d}Z_dZ_dZ_dZ_d$)